GRAPHIC USER INTERFACE HAVING TOUCH DETECTABILITY

BACKGROUND OF THE INVENTION

1. Field of the Invention

The subject invention relates to control panels having a flat panel graphic user interface (GUI). The invention further relates to a remote control having such a control panel.

2. Description of the Related Art

Consumer electronics devices are often provided with remote control units for controlling the device from the comfort of one's easy chair. These remote control units typically are rectangular in shape and carry a plurality of buttons for operating the various control functions of the electronic devices.

However, as the user acquires more and more devices, these remote control units start to accumulate leaving an array of remote control units on the user's coffee table with the problem of selecting the appropriate remote control unit for controlling the desired device.

This problem has been addressed with universal remote control units which either include or may be programmed with the codes for controlling a plurality of different devices in a plurality of different device categories. As such, a user of such a universal remote control unit may control his/her stereo system, television receiver, video cassette recorder, DVD player, CD player, cable box, satellite receiver, etc., using the one universal remote control unit.

Quite naturally, it has now become a feat to design such a universal remote control unit which can be intuitively used to control all of these devices.

U.S. Pat. No. 5,956,025 discloses a remote control unit with 3D organized graphic user interface (GUI) for a home entertainment system which includes a GUI in the form of, for example, a liquid crystal display (LCD) with touch sensitivity in which various icons are displayed on the GUI and represent various control functions which the user selects in order to operate the various control functions of the various devices.

FIGS. **1** and **2** show an example of a remote control unit having such a GUI in the form of a touch sensitive LCD, which is marketed by Philips Electronics. As shown in FIG. **1**, this remote control unit **10** includes an infrared transmitter for transmitting infrared control signals to the devices to be controlled. The remote control unit **10** includes a plurality of hard switches including a "MUTE" button **14**, channel "UP" (**16**) and "DOWN" (**18**) buttons, volume "UP" (**20**) and volume "DOWN" (**22**) buttons, "RIGHT" (**24**) and "LEFT" (**26**) buttons for moving a cursor, and a "BACKLIGHT" button (**28**). The remote control unit **10** further includes a GUI in the form of a liquid crystal display **30** which displays various control icons for the device to be controlled. As shown in FIG. **1**, the controlled device is a television receiver and the control icons include, e.g., "ON" (**32**) and the number "1" (**34**).

FIG. **2** shows the remote control unit **10** of FIG. **1**, now set to control a DVD player, and has various control icons, e.g., "ON" (**32**), "REWIND" (**36**), and "PLAY" (**38**).

However, one problem with these types of remote control units is that it is necessary for the user to look at the remote control unit in order to operate it. While this may not be a problem when using the remote control unit to operate an audio device, such as, a CD player, when the user is watching television, in many cases, the illumination in the room is dimmed to enhance the picture. As such, it is then difficult to discern the markings on the display of the remote control unit. While, for example, the remote control unit **10** of FIGS. **1** and **2** includes the button **28** for activating a back light for the display, the user still must take his/her eyes off of the television in order to reliably operate the remote control unit.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a control panel for an electrical/electronic device which allows a user to use the control panel without looking at the control panel.

This object is achieved in a control panel for an electrical/electronic device, said control panel comprising a graphic user interface (GUI) having a display for displaying various control icons representing various control functions for controlling the electrical/electronic device; means for rendering touch sensitivity to said display enabling a user of the control panel to select the desired control function by touching the respective control icon; and means for rendering touch detectability to the control icons on the display enabling a user to differentiate the various control icons by feel.

With such a control panel, after learning the layout of the control icons, the user is able to select the appropriate simply by detecting the icon by feel.

In a particular embodiment of the invention, the means for rendering touch detectability comprises changing a surface quality of the display at the control icons such that the control icons may be distinguished, by touch, from surrounding areas of the display, wherein the surface quality is an increased height of the display in the areas of the control icons.

As such, each control icon is distinguished by a raised portion of the display, similar to the buttons on a standard remote control unit. These raised portions may be formed into the upper surface of the display. However, this would not allow for changing the configuration, or placement, of the control icons on the display.

In response thereto, in a further particular embodiment of the invention, the display is flexible, and the means for rendering touch detectability comprises an array of actuators positioned beneath said flexible display, and control means for activating select ones of said actuators to locally deform the flexible display in the areas of the control icons.

As such, depending on the location of the control icons on the display, selected ones of the actuators are actuated to press against the underside of the display in the areas of the control icons causing the upper surface of the display to be raised wherever the control icons are arranged.

BRIEF DESCRIPTION OF THE DRAWINGS

With the above and additional objects and advantages in mind as will hereinafter appear, the subject invention will be described with reference to the accompanying drawings, in which:

FIG. **1** shows a plan view of a known remote control unit having a graphic user interface (GUI) showing control icons for a television receiver;

FIG. **2** shows a plan view of the remote control unit of FIG. **1** in which the GUI shows the control icons for a DVD player;

FIG. **3** shows a plan view of a remote control unit having a GUI which incorporates the subject invention;

FIG. **4** shows an edge view of the GUI of the remote control unit of FIG. **3** incorporating a first embodiment of the subject invention;

FIG. **5** shows an edge view of the GUI of the remote control unit of FIG. **3** incorporating a second embodiment of the subject invention; and

FIG. **6** show an array of actuators and a block diagram for controlling the actuators.